Chapter 7
Miscellaneous Information on Survey and Instrument Operations

7-1. General

The purpose of this chapter is to provide general survey operations guidance necessary to obtain the accuracy requirements of the USACE. The user should make special note of survey note requirements and the general principles of survey operation.

7-2. Field Notes

a. Field notes. All field notes will be recorded in a standard hardcover field book as the measurements are made in the field. The typical dimensions of such a field book are 4-7/8 inches by 7-1/2 inches.

(1) All field note entries shall be made with a black lead pencil or black ink. Notations made by other than the original surveyor shall be made with a colored pencil so a clear distinction exists between the field observations and subsequent corrections, adjustments, comments, or supplemental data.

(2) The first two pages of each field book shall be reserved for the book index and shall not be numbered. The index should contain the date and description of the survey. The description will indicate the type of field activity performed: traverse, levels, topography, etc. Also, the index should list the actual pages used in the field book for the particular description entry. The remainder of the field book shall contain the actual field data and shall be numbered beginning at page one.

(3) The first page of each entry should contain at the top left side of the page the name of the installation or project location and a specific project title (e.g., James River - Kingsmill Dam), the type of work being done, and a detailed description of the work. This description should include as much information as necessary to detail what was done during the course of the survey.

(4) At the top of the right side of the right half of the page, the actual date of the survey, weather conditions, type and serial number of instruments used, members of the crew and their assignment, map or field book references, and other remarks as necessary for a complete understanding of the survey shall be written.

(5) No data will be written on scratch paper and/or on the back page of the field book and copied into the book later. Also, details of the survey will not be carried in the mind of the surveyor or until the end of the job and then entered into the field book. Information copied or transferred into the field book or carried in the mind of the surveyor is subject to more error than data recorded as they are obtained. Systematic recording of data will help to improve accuracy. No erasures should be made in the field book. If errors are made, they will be crossed through and the correct ones will be written in such a way that the original data remain legible. No figure should ever be written over the top of another nor should any figure be erased. If a whole page is in error, the complete page will be lined or crossed through and the word "VOID" will be written in large letters diagonally across the page. A cross reference will be entered on the voided page showing the book and page number where the correct information may be found. Also, an explanation of the error and the correction will be entered in the field notes.

(6) If a data collector is used, only setup information (i.e., description, HI, sketch, etc.) and every 20^{th} shot should be recorded in the field book. This information is used to check the instrument for systematic errors.

(7) When it is necessary to copy information from another field book or other source, a note will be made which clearly states that the information was copied and the source from which it came.

(8) If the notes are a continuation from another field book, a description will be written in the field book to the effect "NOTES CONTINUED FROM BK XXXX PAGE XX." A similar description (e.g., CONTINUED IN BOOK XXXX FROM PAGE XX) will be written on the last page of each section of notes if those notes are to be continued either in another book or on another page which is not adjacent to the current page.

(9) The sketch should show all the details, dimensions and explanatory notes required. The sketch should be written on a whole page whenever possible. If necessary, multiple pages with the sketch divided equally among the pages should be used if the sketch has too many details to be shown on one page. Sketches of structure sections must be well drawn as they are often the basis for working drawings of existing structure(s). If applicable, show the center-line station of all creeks and draws and edge of channel on all rivers and streams crossed.

(10) Note in the field book any conversations with owners regarding property corners. Use owner's full name if possible.

(11) At the end of each day of work, the field notes shall be signed and dated by the crew chief or individual responsible for the work.

b. Minimum horizontal control survey field note requirements.

(1) When using the appropriate applicable equipment (e.g., EDM, total stations, etc.) to do a traverse, the field notes shall contain the height of the instrument (i.e., HI) above the station occupied, the target height (i.e., TH) above the station being measured to, both the horizontal angles and the vertical angles, and distance readings obtained with the instrument.

(2) Even though the EDM, total station, etc. being used may be capable of computing and displaying a horizontal distance and a difference in elevation based on the slope distance and vertical angle obtained by the instrument, the vertical angles shall still be recorded in the field book. All these measurements shall be clearly labeled as vertical angle, slope distance, and horizontal distance.

(3) In addition to the measured angles, a description of the point occupied shall be included. This description shall include the type of monument (e.g., brass disk, RR spike, 1/2" re-bar, etc.), general location (e.g., 15' east of north end of Kingsmill Dam centerline & 20' south of fire hydrant), and type of material point is set in (e.g., chiseled cross on concrete slab, flush with gravel road, etc.). A sketch of the location of the point relative to existing physical features and reference ties shall be made and included in the notes.

(4) If a horizontal control line is used, a sketch of it shall be made and included in the notes. This sketch does not need to be drawn to scale, but it should include the relative position of one point to the next and the basic control used. Figure 7-1 shows some examples of field notes taken during a typical horizontal control survey.

c. Minimum vertical control survey field note requirements.

(1) A short description of the course of the level line shall be entered in the field book.

(2) Entries shall be made in the book that give the references to the traverse notes and other existing data used for the basic elevations (e.g., TRAVERSE BOOK XXXX PAGE XX, USGS Quad XXXXXX, NOS Chart XXXX, etc.).

(3) A complete description of each point on which an elevation is established shall be recorded in the field book adjacent to the station designation. Figure 7-2 shows some examples of field notes taken during a typical vertical control survey.

7-3. Entry Rights

When entering property to conduct a control survey, the rights of the property owner will be respected. The following details some minimum guidelines to follow in an effort to respect the rights of the property owner.

a. Permission to enter a military installation and other private property will always be acquired by the District prior to entering such property. While on the military installation, members of the survey crew will adhere to all of the stipulations (e.g., rules, regulations, directives, verbal guidance, etc.) set forth by the Base Installation Commander or his designated representative. The same basic guidelines are applicable when the right to enter private property is given.

b. Government and private property shall be protected at all times. The right to enter a property does not give the crew the license to destroy or cause excessive damage to the property. Every effort should be made not to damage or cut trees, shrubs, plants, etc. on the property. If such must be done, the Base Installation Commander or in the case of private property, the private property owner, is the only person who can grant permission to do so.

c. As practicable, the property entered shall be returned to its condition prior to entry once the survey is completed. Gates and other structures should be left in the position in which they were found prior to entry. If a gate is closed, do not leave it open for any long period of time.

d. Return all borrowed property (e.g., keys, maps, etc.) as instructed by the property owner or designated representative.

e. Survey points should be placed in such a way as to not obstruct the operations of the property owners or be offensive to their view. Monuments set as a result of the survey should be set below ground level to prevent damage by or to any equipment or vehicles. Extra care must be taken when setting a survey point at or near airports.

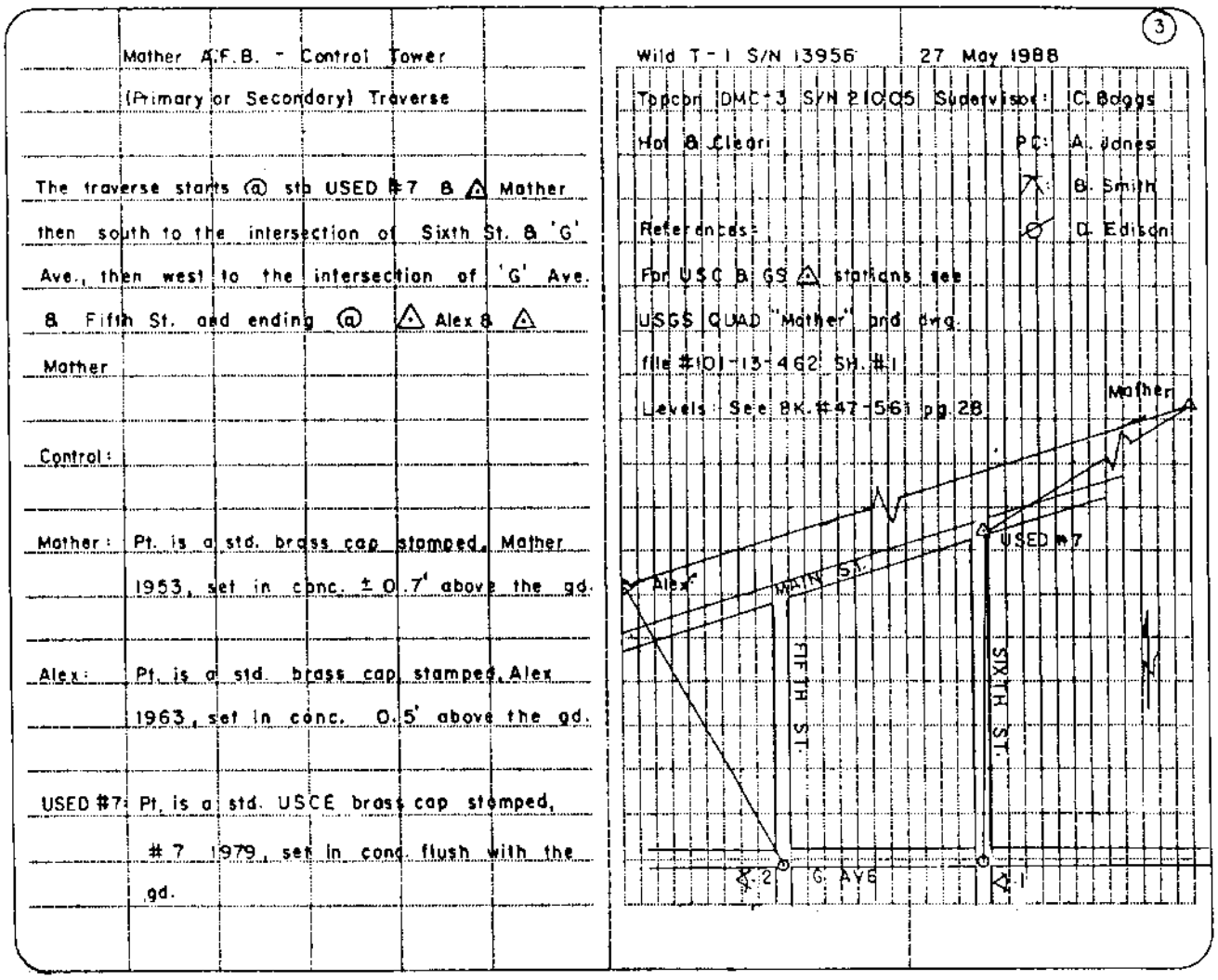
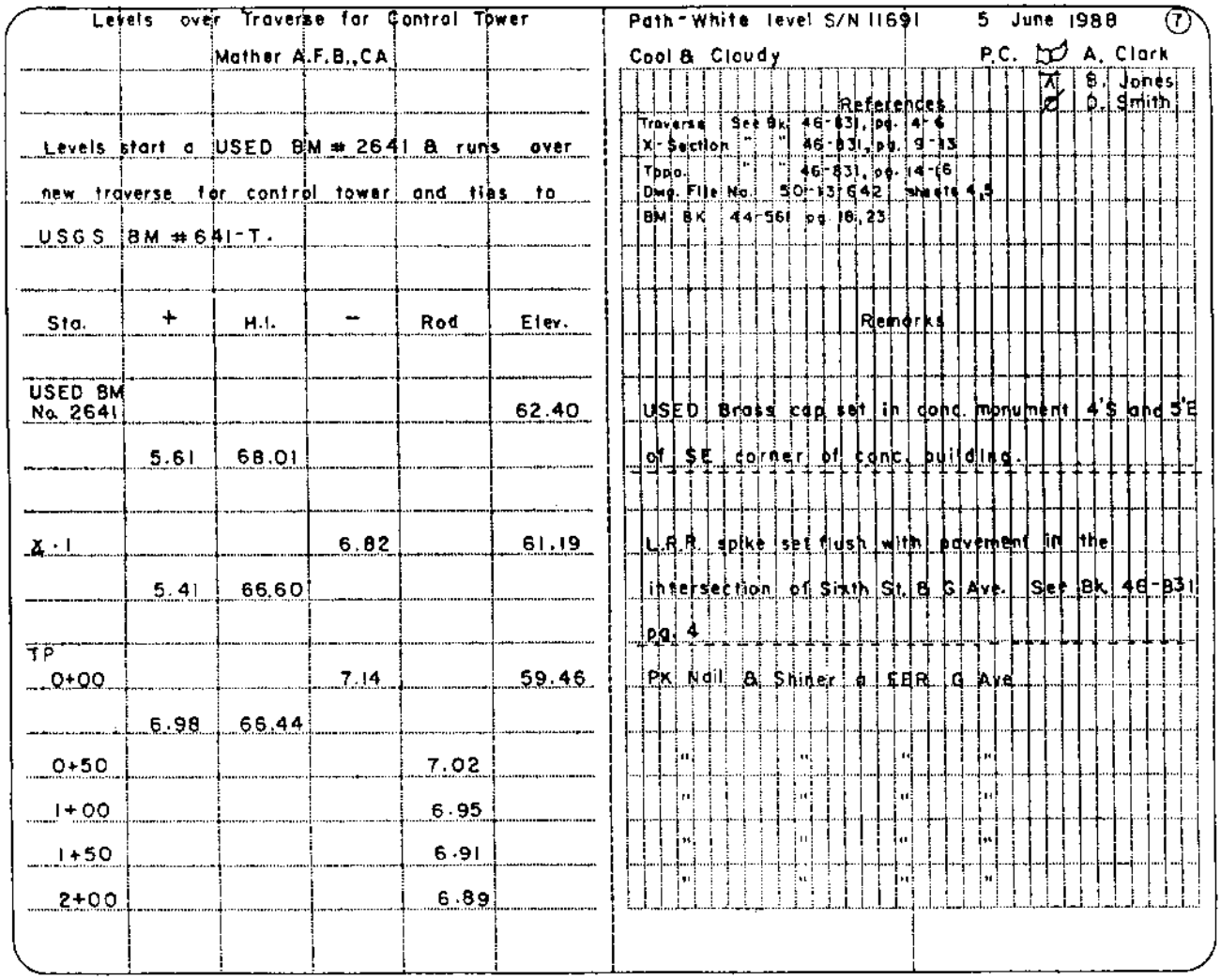


Figure 7-1. Field notes taken during a typical horizontal control survey

f. Any pre-marks set on military installations or private property will be removed as soon as possible after the survey work is completed or the Base Installation Commander, property owner, and/or designated representative requests such.



Levels over Traverse for Control Tower
Mather A.F.B., CA

Levels start a USED BM # 2641 & runs over new traverse for control tower and ties to USGS BM #641-T.

Sta.	+	H.I.	−	Rod	Elev.
USED BM No. 2641					62.40
	5.61	68.01			
X-1			6.82		61.19
	5.41	66.60			
TP 0+00			7.14		59.46
	6.98	66.44			
0+50				7.02	
1+00				6.95	
1+50				6.91	
2+00				6.89	

Path-White level S/N 11691 5 June 1988 (7)
Cool & Cloudy P.C. A. Clark
R. Jones
D. Smith

References
Traverse See Bk. 46-831, pg. 4-6
X-Section " " 46-831, pg. 9-13
Topo. " " 46-831, pg. 14-16
Dwg. File No. 50-13-642 sheets 4,5
BM Bk 44-561 pg 16, 23

Remarks
USED Brass cap set in conc. monument 4'S and 5'E of SE corner of conc. building.

L.R.R. spike set flush with pavement in the intersection of Sixth St. & G Ave. See Bk. 46-831 pg. 4

PK Nail & Shiner @ EBR G Ave.

Figure 7-2. Field notes taken during a typical vertical control survey